Specification 03/09

PROTECTIVE LINING SYSTEM FOR CONCRETE MANHOLE RISERS, LIFT STATIONS/WET WELLS.

With

Prefabricated Polypropylene Liner Sections

(A) SCOPE:

Furnish a prefabricated Polypropylene (PP) liner to be installed in concrete sanitary sewer riser sections and lift stations/wet wells, which is resistant to the chemical environment normally found in wastewater transmission systems. The PP liner shall be a non load-bearing component integrally cast with and anchored in new precast concrete manhole riser section(s) during the casting process at a precast concrete manufacturing facility.

(B) POLYPROPYLENE (PP) MANHOLE/LIFT STATION/WET WELL RISER SECTION LINER:

1.0 The prefabricated (PP) liner sections shall consist of 3 or more segments of equal height and radial length that when welded together will form a section which corresponds to the inside diameter of the concrete structure and be of suitable heights.

1.1 The liner section(s) shall incorporate an outward facing horizontal return that will be flush with the top and bottom ends of the concrete joint mating face.

1.2 The outside surface of the PP liner shall have ribs molded in opposing directions on the vertical axis and waterstop turnbacks on the horizontal axis to ensure adequate anchoring with the precast concrete section and meeting a pressure test of 1 bar (14.7 PSI) or the prescribed ASTM criteria for vacuum testing of concrete sewer manholes.

1.3 Watertight pipe connections for inside drops etc shall be by gasketed PP pipe bell connectors or PP sleeves for boot type connectors attached at locations as specified by the design engineer.

1.4 PP pipe connecting bells/boot sleeves shall be attached to the PP manhole liner by hot air extrusion welding with PP welding bead and shall extend to the outside profile of the precast concrete structure.

(C) MATERIALS:

1.0 POLYPROPYLENE (PP) – 100% Polypropylene copolymer

1.1 Minimum Thickness – 0.3" (8mm)

1.2 Colour – Dull mustard/goldenrod

1.3 Hardness – 80 Rockwell (R scale)

(D) PHYSICAL PROPERTIES:

1.0 Abrasion resistance - Falling Sand (ASTM D968) Thickness of material removed passes

Passes	0-5	5-10	10-15	15-20	20-25	Total for 25 passes
Thickness removed	.04 mil	0.04 mil	0.6 mil	0.04 mil	0.12 mil	1.2 mil

1.1 Percolation Test - Water absorption of top surface - 0.032%

1.2 Thermal shock (CSA-B45-M93) 100 thermal cycles- no sign of surface defects

2.0 Chemical Resistance

2.1 Chemical Resistance (Selected Reagents) (ASTM D1308)

Nitric Acid 69%	No surface Degradation - Surface Staining

Hydrochloric Acid 60%	**No surface Degradation**
Ammonia 28%	**No surface Degradation**
Sodium Hydroxide 5.25%	**No surface Degradation**
Sulfuric Acid 50%	**No surface Degradation**
Sulphuric Acid 70%	**No surface Degradation**
Sulphuric Acid 80%	**No surface Degradation**
Acetone	**No surface Degradation**
Unleaded Gasoline	**No surface Degradation**
Turpentine	**No surface Degradation**
Acetone Immersion (ASTM. D2152)	**No Attack**

(E) INSTALLATION IN CONCRETE (PRECAST):

1.0 The PP liner shall be cast integrally within monolithic precast concrete manhole riser section(s) or lift station/wet well section(s) in accordance with the liner manufacturer's recommendations and specifications.

1.1 The "Wet Cast" method is the recommended precasting process for manhole riser(s), lift station/wet well liners.

1.2 Inside surfaces of PP liners shall be free of bulges, dents and other defects that could result in inside diameter variations greater than ¼" (7mm). No liner shall have holes or openings which will permit the intrusion of liquids or gasses through the liner wall and into the concrete matrix. Manhole lifting devices shall not penetrate any surface of the liner.

1.3 The liner must be fully supported during the casting process.

1.4 The precast concrete section joint surfaces shall be parallel and free of excess concrete to assist in creating a proper seal of the section joints.

1.5 The finished riser section(s) shall not be moved until adequate hydration has occurred so as to not damage a semi-rigid casting.

(F) FIELD ASSEMBLY AND INSPECTION OF PRECAST CONCRETE MANHOLE RISERS, LIFT STATIONS/WET WELLS WITH PP LINER:

1.0 During installation of the lined riser sections pipe connections shall be completed as per the manufacturer's standard method and details.

1.1 Outer joints of precast concrete riser sections shall be gasketed or sealed as directed by the utility and/or precast manufacturer.

1.2 All internal PP seams at the manhole/riser section joints shall be sealed.

1.2a Recommended method of sealing internal PP joint seams is with preformed butyl strips (ASTM C-990 section 6.2) applied to the top face of the outward facing horizontal return of the liner at the same time as gaskets or other sealing materials are attached to the outer joint. (see supply sources for flexible joint sealant).

1.2b It is optional to seal internal PP seams at the manhole/riser section joints by hot air extrusion welding with PP welding bead as per the liner manufacturer's standard method and details.

1.2c Field welding of PP internal manhole section joints is acceptable only after vacuum testing the structure has been completed in a satisfactory manner. It shall be the responsibility of the contractor to field weld the manhole section joints (see list of certified welding contractors).

1.3 Mechanical anchoring attachments through liner surfaces must be sealed with an approved elastomeric sealant. (See approved source recommendations).

1.4 After assembly is complete, the interior surface of the liner shall be free of pinholes, cracks, pits or defects which are detrimental to the intended use of the liner. No liner shall have holes or openings which will permit the intrusion of liquids or gasses through the liner wall and into the concrete matrix. There shall be no exposed concrete/mortar on any inside liner surface to include (but not limited to) pipe connectors and manhole riser section joints.

1.5 Testing of the lined manhole, lift station/wet well structure to meet pressure test of 1 bar (14.7 PSI) or the prescribed ASTM criteria for vacuum testing.
PLEASE NOTE: There is no correlation between vacuum (air) and hydrostatic tests (see ASTM C1244-93). Vacuum testing with the presence of hydrostatic pressure (high ground water conditions) provides unreliable test results.

SUPPLY SOURCES OF RECOMMENDED ELASTOMERIC BUTYL SEALANTS AND ADHESIVES FOR INSTALLATION OF THE PP MANHOLE RISER(S), LIFT STATION/WET WELL LINERS

BUTYL RUBBER PREFORMED FLEXIBLE JOINT SEALANT

PRODUCT: RU106-RUB' R-NEK "LTM"
HENRY COMPANY, SEALANTS DIVISION
1277 Boyles St.
Houston, TX 77020
TEL: 713 /671-2494 - 800 / 231-4549
FAX: 713 / 673-7714
www.henry.com

PRODUCT: PRO-STIK
PRESS-SEAL GASKET CORPORATION
2424 W. State Blvd.
Fort Wayne, IN 46804
TEL: 219 / 436-0521 - 800 / 348-7325
FAX: 219 / 436-1908
www.press-seal.com

ELASTOMERIC SEALANTS - RESILIENT CURING NON SHRINK CAULK TYPE

NOTE: The sealant manufacturer's application and surface preparation procedures (including primer) must be followed.

PRODUCT: SIKAFLEX 1a
Polyurethane sealant;
Use SIKAFLEX 449-203 PRIMER
SIKA CORPORATION
201 Polito Ave.
Lyndhurst, NJ 07071
TEL: 800 / 933-7452
www.sikaconstruction.com

PRODUCT: SCS 1003
PRODUCT: VULKEM 921
Polyurethane Sealant;
Tremco 171 PRIMER (porous substrates)
TREMprime NON-POROUS PRIMER (metal substrates)
TREMCO, INCORPORATED
3735 Green Road
Beachwood, OH 44122
TEL: 800 / 852-8173
www.tremcosealants.com

BONDING AGENT FOR DISSIMILAR MATERIALS I.E. POLYPROPYLENE, POLYETHYLENE, FIBERGLASS, URETHANE & VARIOUS METALS ETC.

PRODUCT: SCOTCH WELD DP-8010NS
3M
INDUSTRIAL BUSINESS
INDUSTRIAL ADHESIVES AND TAPES DIVISION
3M Center, Building 21-1W-10, 900 Bush Ave
St. Paul, MN 55144-1000
TEL: 800/362-3550
www.3M.com/industrial

CERTIFIED POLYPROPYLENE FIELD WELDING

Northwest Concrete Waterproofing
10410 40th Ave East
Tacoma, WA 98446
Tel 253-606 4964

Global Liner Systems
PO Box 326
Spanaway, WA 98387
Tel 253 686 1114

Plastic Composites Inc.
1222 Camp Ave
Mount Dora, Fl 32757
Tel 352-383-0194
www.yourpci.com